

7/14/04
Patent Claims ~~WHAT IS CLAIMED IS~~

1. A method for determining speech quality using objective measures, in which characteristic values for determining speech quality are calculated by comparing spectral short-time properties of a speech signal to be assessed to a reference speech signal, characterized in that, prior to comparing the properties of the speech signals, differences in mean spectral envelopes are reduced by first calculating from them a spectral weighting function with which the spectral short-time properties of the speech signals in all time segments under consideration are weighted, so that the differences in the mean spectral envelopes are thereby included only to a limited extent in the quality characteristic value to be calculated; and that the limits of the frequency bands used are made variable for calculating the signal intensity, so that, for each signal segment under consideration in all evaluated frequency bands, the calculated intensities of the reference speech signal and the signal to be assessed differ as little as possible from each other.
2. The method as recited in Claim 1, characterized in that, first of all, the mean spectral envelopes of the speech signal to be assessed and the reference speech signal are calculated in the form of a mean power density spectrum, and a spectral weighting function $W_T(f)$ is calculated from the quotients of both spectra, the short-time power density spectra of the reference speech signal being weighted with said spectral weighting function $W_T(f)$ prior to calculating a quality characteristic value.
3. The method as recited in Claims 1 and 2, characterized in that the weighting function $W_T(f)$ to be calculated is calculated only from partial regions of the calculated mean spectral envelopes of the speech signal to be assessed and the reference speech signal and, consequently, the differences in mean spectral envelopes between both signals are reduced only in partial spectral regions.
4. The method as recited in Claims 1 through 3, characterized in that, prior to

calculating the quality characteristic values, there is an integration of the signal intensity for each evaluated short time segment in frequency groups, the limits of the frequency groups being variable on the frequency axis, but the width of the frequency groups remaining constant on the pitch scale, and that the specific loudness is calculated from the signal intensities in the frequency groups, the limits of those frequency groups being used in which the calculated differences in the specific loudness between the signal to be assessed and the reference speech signal exhibit the smallest difference in the band and time segment under consideration.

5. The method as recited in Claims 1 through 4, characterized in that the quality characteristic value is calculated from the similarity of the spectral representations in each time segment under consideration, the similarity representing a correlation coefficient, averaged over all time segments under consideration, between the spectral representation of the speech signal to be assessed and the spectral representation of the reference speech signal in the respective time segment.

6. The method as recited in Claim 5, characterized in that the correlation coefficient between the spectral representation of the speech signal to be assessed and the spectral representation of the reference speech signal in the respective time segment is calculated from only a partial region of the spectral representation, i.e. not all calculated spectral values are taken into consideration for the calculation of the quality characteristic value.

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